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# **Reflecting on the pedagogic benefits of an assessed class-room based professional complex emergency simulation: Responding to fire and other hazards in an industrial urban setting under (time / assessment) pressure**

**Simon Griffiths and Richard Kotter**

**Department of Geography and Environmental Sciences**

**Northumbria University, Newcastle upon Tyne, UK**

# MSc Disaster Management and Sustainable Development Integrated Emergency Management module

Module Learning Outcomes (MLOs) – which feed into/cover partially the Programme Learning Outcomes (PLOs)

## Knowledge & Understanding:

- MLO1: Evaluate the effectiveness of approaches to integrated emergency management
- MLO2: Employ structured risk based methodologies to define the potential impacts from emergencies.

## Intellectual / Professional skills & abilities:

- MLO3: Identify and evaluate limitations in delivering resilience despite integrated management approaches being applied
- MLO4: Critically review the methods for resilience building through anticipation and planning based on local, national and/or international drivers.

## Personal Values Attributes (Global / Cultural awareness, Ethics, Curiosity) (PVA):

- MLO5: Evaluate how integrated emergency management is applied to all populations in an equitable manner in accordance with human rights.

(see also Phelps (2010); Phillips et al. (2012); Haddow et al. (2014); McCreight (2017))

# Formative (assessment) task

- **Purpose:**

- to have groups plan a response to an incident in the classroom
- present to the whole class with justification for what they think is important, etc.

- **Context:**

- early phase of the response with limited information available

- **Outturn:**

- Student frustration at not being able to answer the question just like the initial phase of an incident, planned for, or not...
- Underpins the Integrated Emergency Management process



# Purpose of summative assessment

- Application of knowledge in a non-linear fashion to respond to an **authentic** setting for major incident response management
- **Authentic learning**
  - *‘Authentic learning typically focuses on **real-world, complex** problems and their **solutions**, using **role-playing exercises, problem-based activities**, case studies, and participation in virtual communities of practice’ (Lombardi, 2007)*



Contextualised with  
images from live play  
exercises, videos  
from real incidents,  
etc. we've been  
involved in

# The summative assessment

- Responding to an unseen desktop exercise
  - Big Bang event
  - By several IEM teams (groups) – Fire & Rescue Service, City Council, private company [could be any organisation that is not the specialist public sector or local authority]
- More concerned with demonstrating thought processes in responding to an incident
  - Adaptability tested.
  - Group (and inter-group) working dynamics.
  - Time pressures (becoming more severe along the evolving incident).

## You and your role



- In your group, you are (collectively) working for a City Council, in addition to your environmental health role, you are the responsible officer for emergency planning.
- You are the senior manager in the office meaning that any acute environmental and health protection incidents are referred to you and you take the lead in undertaking the environmental public health risk assessment on behalf of the Council.
- As part of the Civil Contingencies Act 2004 and the generic emergency plan, your role is to advise other agencies and your Chief Executive as to how to respond alongside the emergency planning team.

## You and your role

- In your group, you are (collectively) an Emergency Manager working for the Fire Service, a City Council, and a Private company respectively. You are the responsible officer for emergency planning.
- You are the senior emergency planning manager in the office meaning that any acute emergency incidents are referred to you and you take the lead in undertaking the risk assessment on behalf of your organisation.
- As part of the Civil Contingencies Act 2004 and your organisation's generic emergency plan, your role is to advise other agencies and your Chief Executive as to how to respond alongside the emergency planning team.

# The summative assessment

- Desktop exercise:
  - Builds with inputs at **undisclosed time intervals**.
  - Unknowns, just like a real response.
  - Uncontrolled open fire – public health threat from products of combustion, potential spread, disruption to infrastructure, etc.
  - Complicated by asbestos loss from structure and spillages of chemicals during evacuation, food model affected
- We are primarily assessing **thought processes in application** over recall
  - Adaptability.
  - Group working (including inter-group) dynamics.
  - Time pressures (becoming more severe along as the incident as evolving).

## Inject 1: A “Big Bang” incident

It's 1341 on a sunny Tuesday in late July, a fire is reported by members of the public. They call 999 and ask for the Fire Service.

The location is given as a factory on the Byker Industrial Estate of Newcastle upon Tyne.

The cascade between the emergency services triggers a notification to the Council's Civil Contingencies team and is passed to you to assist in the response. It is now 14:10.

You are told that (a) a fire has been reported at Disk4U, a CD/DVD manufacturer, (b) fire and ambulance services are in attendance, (c) no casualties are currently reported.



## Inject 2a: Incident developing: @1432

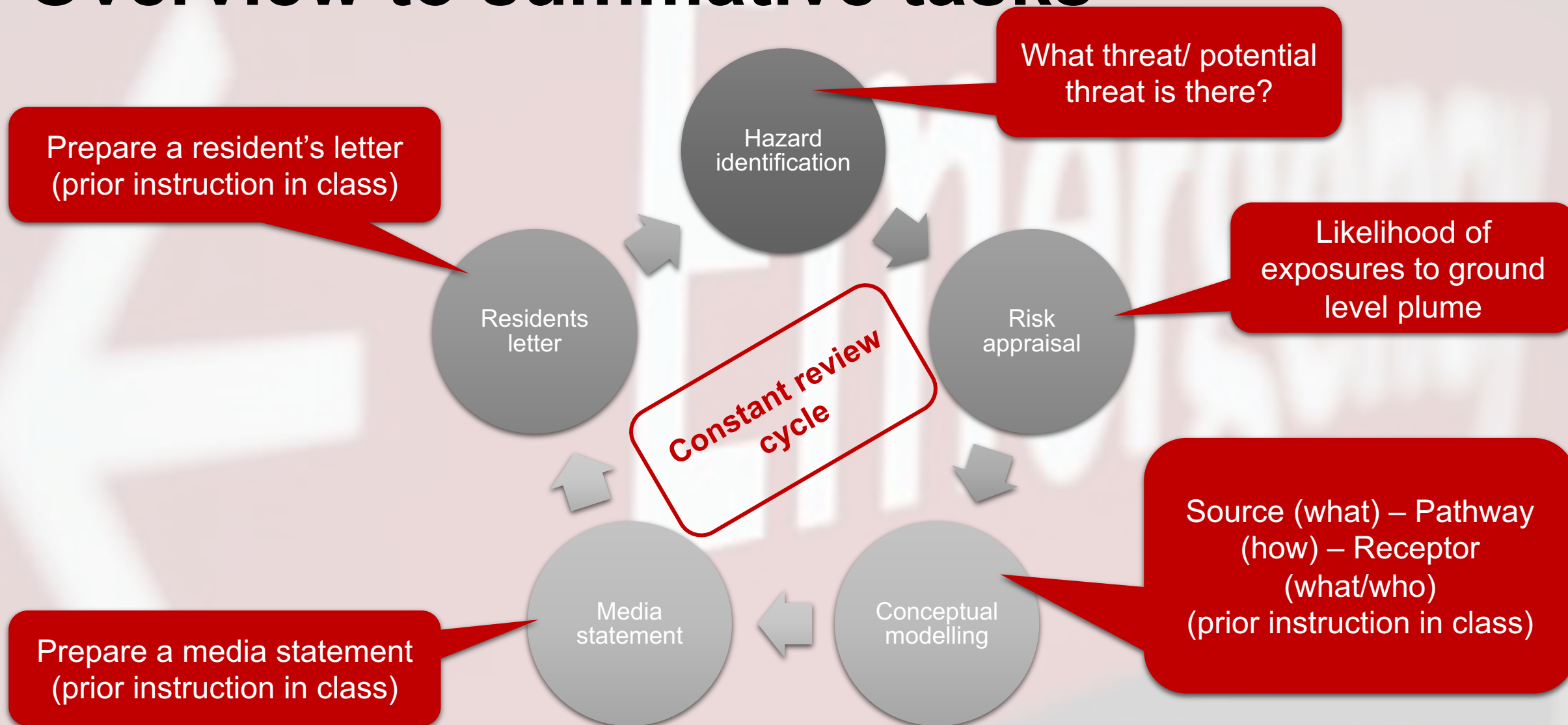
The fire service have declared this a major incident and have 5 pumps ('fire engines') on the scene.

A large plume has been produced which is visible across the east of the city. It is heading across a light rail line and then out beyond the city itself towards cultivated farm land.

The Police have called a tactical (or 'silver meeting') to be held at Police HQ.



# Overview to summative tasks



# What's the hazard? What are (current) aggravating factors?

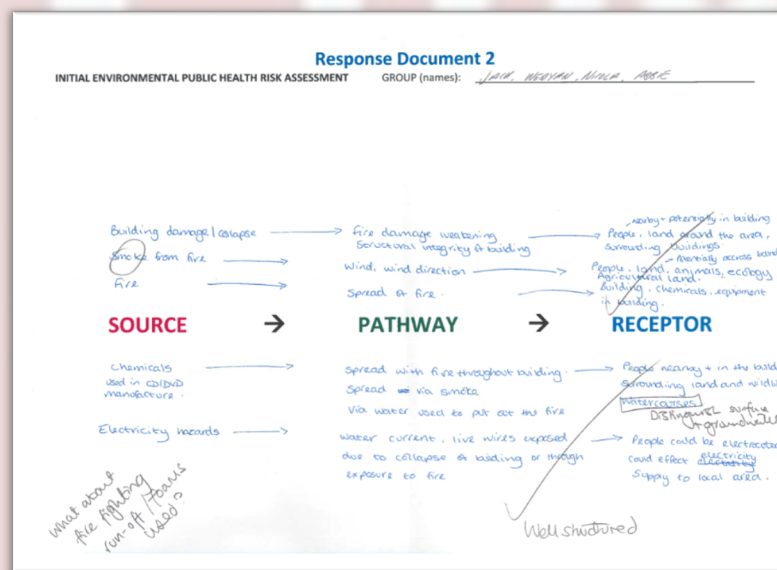
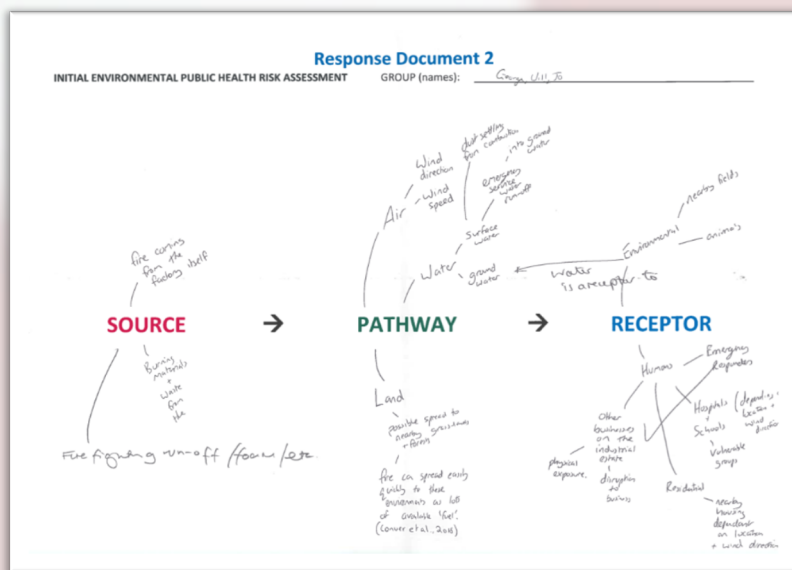
## ■ Alongside injects, specific tasks are required

### ■ E.g.

- Hazard identification + factors thought to aggravate situation
- Application of a **pathway conceptual model**\*



**Continuous feedback loop:** Have your decisions changed with each new inject? Should they? Students / Teams challenged to review each time.



Jack, Nicola, Abbie, Welayan.  
**Response Document 1**  
List the hazards and identify any aggravating factors

Hazard Identification	Aggravating factors
• Fire <i>increase in particulate &amp; smoke (air pollution) products of smoke inhalation</i>	- Chemicals - Wind would aggravate smoke, wind direction.
• Building is damaged by fire (integrity)	- Fire damage, may effect structural integrity.
• Collapse of building, depending on damage	- <i>not really an aggravating factor</i>
• Chemicals from LD's/DVBs burning - Chemicals from materials used to make CO's/PVBs	- Chemicals would aggravate the fire. - Flammability chemicals
• Close proximity to other industrial buildings.	- Sources of ignition around the proximity and on the premises.
• Electrical Hazards	- aggravated from water used to put fire out.
What about materials comprising the building? " " time of day season? It's late July around lunchtime. so people out in summer weather & perhaps schools closed?	

\*Described originally by Holdgate (1979) but adaptable to a range of uses, e.g. Narayan, et al (2012), Davies, (2017) and Waldschläger, et al (2020)



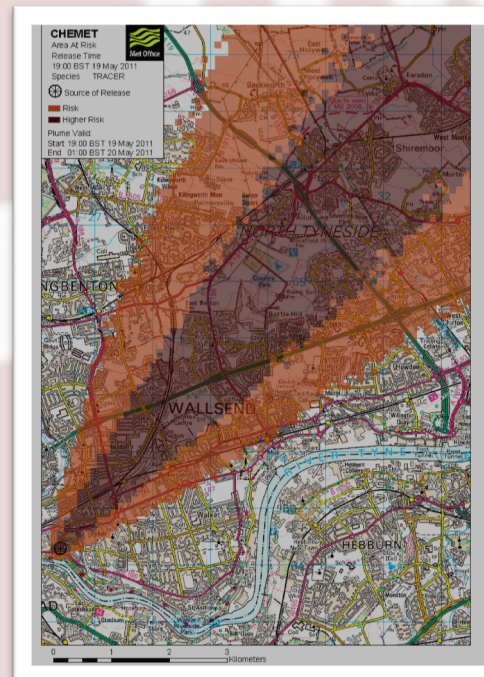
# Risk assessment and scaling the event

- Defining the student's perception of risk:

- Key is *justification*
- Why is the group thinking the way it is?
- Is the risk score justifiable?

- Includes real world materials

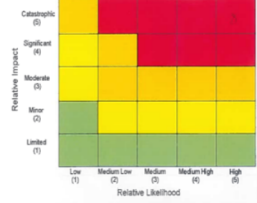
- CHEMETs
- Material Safety Data Sheets (MSDS) for specific chemicals



Jack, Nicola, Wredyan, HBB

**Response Document 3**

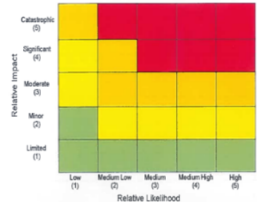
Using your table of hazards (response document 1), identify the risk score (likelihood x impact) for each and justify your reasoning on the table below.



Hazard (response document 1)	Risk score (above)	Justification
Fire	25	Due to the spread that could occur, structural integrity of the building, severe harm could be done through smoke.
Smoke (air pollution, inhalation)	25	Inhalation of smoke from fire could be harmful. Smoke could spread in the building, surrounding areas and could still be present in the air after the fire has been extinguished. Smoke inhalation could be harmful to the health of people in the area.
Chemicals on the premises	25	Flammability of the chemicals, inhalation of the chemicals could be harmful to the health of people in the area. Chemicals could be released into the air and could be harmful to the health of people in the area.
Building structure	25	Building structure could be damaged by fire. Building structure could be damaged by fire. Building structure could be damaged by fire.

**Response Document 3**

Using your table of hazards (response document 1), identify the risk score (likelihood x impact) for each and justify your reasoning on the table below.



Hazard (response document 1)	Risk score (above)	Justification
Further sources of ignition (industrial estates)	25	Business like that likely to have further hot objects like significant from electrical and gases.
Combustion fumes + dust	20	Very likely to be inhaled by those working with equipment and machinery. Should be avoided at all costs.
Open burners-burning CO2 plants	20	Very likely to be inhaled by those working with equipment and machinery. Should be avoided at all costs.

# Multi-agency response: interoperability/interactivity



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- Identify the synergies available to deliver a comprehensive response
  - What do the respective groups need to know (including from each other)?
  - Who (which organisation / team / source) can provide the information/response?
- Two approaches taken:
  1. Groups are assigned a specific agency with a clear agenda, and the groups interact internally and with each other across the classroom; or
  2. Groups are managing everything and identify who can help them to tackle the hazards identified and so manage the incident as it evolves.

*George, Will, Jo*

Response Document 5

Overall management of the incident: identify impact, action needed, agency involved

Impact (hazard)	Action	Agency to act
Disruption to Transport Lines	Closure of major roads lines within the plane area of the CHEMET. If within flight path possible action needed (diverting paths)	Local Authority co-ordinating with private companies (NHS) from airport. <i>Key locally: Northumbria Road</i>
Impacts on local hospitals - due to through ventilation units, through windows	Strong indoors, keep windows/doors shut, filter out for further alerts from media	Local Authority, PHE & NHS all involved with continuing communication.
Impact on residential areas allotments within their area	" - provide info to risk assess road given during the incident	" Local Authority, PHE
nearby schools in parking	" - provide closure to schools	" Local Authority, <i>Primary closed as late July.</i>
Public coming nearby to see what's going on + taking things	Create a significant perimeter around the fire/plane and restrict those near to create zone	Police, Local Authority <i>as Highway Authority</i>
Farmland contamination from dusts + pollutants	Keep them informed potentially bring in livestock + their loads after plane has been dealt with	Local Authority, PHE <i>FSA? DEFRA?</i>
Fire spreading to other industrial units	Try isolate the fire and put it out to prevent a spread to other nearby units	Fire service
Damage to local businesses and economy	Keep them up to date with info advice to enable them to resume trading at earliest time	Local Authority <i>Good</i>

# The student response to our approach

- **Prior to the exercise**

- Not knowing much about the incident can cause a *little* worry
- Supportive environment for students' worries

- **During the exercise**

- Students are focussed on their tasks
- Good group debate(s)
- Live research is undertaken – access to IT in the room

# The student response to our approach

- **After the exercise**

- Positive feedback
- Enjoyed the challenge
- Pre-exercise reservations about the assessment disappear when they get on with the response: focus
- Recognise that they 'survived' through the ordeal
- Tired from the concentration, just like an authentic response ...
- Fun?!





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# Question(s)

Thank you for your attention – any questions?

Please now, or afterwards by e-mail:

[simon.griffiths@northumbria.ac.uk](mailto:simon.griffiths@northumbria.ac.uk)

[richard.kotter@northumbria.ac.uk](mailto:richard.kotter@northumbria.ac.uk)



# References

- Davies, S. (2017). Annual Report of the Chief Medical Officer 2017, Health Impacts of All Pollution - what do we know? London: Department of Health (UK).
- Haddow, G.D., Bullock, J.A. and Coppola, D. (2014). *Introduction to Emergency Management. Fifth ed.* Elsevier.
- Holdgate, M. W. (1979). *A Perspective of Environmental Pollution*, Cambridge University Press.
- Lombardi, M. M. (2007). *Authentic learning for the 21<sup>st</sup> century: An overview*. Educause Learning Initiative [Online] Available at [https://www.bemidjistate.edu/academics/distance/edge/wp-content/uploads/sites/90/2016/02/AuthenticLearning\\_for\\_21\\_century.pdf](https://www.bemidjistate.edu/academics/distance/edge/wp-content/uploads/sites/90/2016/02/AuthenticLearning_for_21_century.pdf) (accessed 17/09/2021).
- McCreight, R. (2017). *An Introduction to Emergency Exercise Design and Evaluation*. Second ed. Rowman & Littlefield.
- Narayan, S., Hanson, S., Nicholls, R. J., Clarke, D., Willems, P., Ntegeka, V. & Monbaliu, J. (2012). A holistic model for coastal flooding using system diagrams and the Source-Pathway-Receptor (SPR) concept. *Natural Hazards and Earth System Sciences* 12, 1431-1439.
- Phelps, R. (2010) *Emergency Management Exercises: From Response to Recovery, Everything You Need to Know to Design a Great Exercise*. San Francisco, CA: Chandi Media, 2010. Print.
- Phillips, B., Neal, D.M. and Webb, G.W. (2012). *Introduction to Emergency Management*. CRC Press.
- Waldschläger, K., Lechthaler, S., Stauch, G. & Schüttrumpf, H. (2020). The way of microplastic through the environment – Application of the source-pathway-receptor model (review). *Science of The Total Environment* 713, 136584.